

ATTORNEY DOCKET NO. Q64938
PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Tsuyoshi KITAHARA

Appln. No.: NOT YET ASSIGNED

Group Art Unit: NOT YET ASSIGNED

Confirmation No.: NOT YET ASSIGNED

Examiner: NOT YET ASSIGNED

Filed: June 29, 2001

For: PIEZOELECTRIC VIBRATOR UNIT, MANUFACTURING METHOD THEREOF,
AND INK JET RECORDING HEAD INCORPORATING THE SAME

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 4, ninth paragraph insert the following:

Figs. 8A and 8B are section views showing another embodiment of the present invention.

Page 4, tenth paragraph insert the following:

Figs. 9A and 9B are section views showing other embodiments of the present invention.

Page 6, third paragraph insert the following:

Figs. 3A-3B show an embodiment of the method of manufacturing the piezoelectric vibrator unit.

A green sheet 32 of a piezoelectric material and having a predetermined thickness is prepared. In the green sheet, through holes 30a and 31a are opened in the vicinity of both ends thereof so as to coincide with the arrangement pitch of the piezoelectric vibrators (Fig. 3A). On the surface of the sheet, a strip-like non-conductive region 33 is formed in a region which is nearer to a center portion than the through

holes 31a and which coincides with the front ends of the internal common electrodes 17. Conductive layers 34 and 35 are formed by, for example, printing of a conductive coating material so as to fill the inside of the through holes 30a and 31a (Fig. 3B).

IN THE ABSTRACT:

Please delete the present Abstract of the Disclosure and replace it with the following new Abstract of the Disclosure.

In order to simplify a step of forming a conductive layer for external connection and improve the reliability thereof, at least either internal individual electrodes or internal common electrodes, which comprise of a piezoelectric vibrator, are connected with each other at through holes situated spaced away from an end face of the piezoelectric vibrator and connected to either a segment electrode of a common electrode, which are formed on one surface in a longitudinal direction of the piezoelectric vibrator. According, it is not necessary to form a conductive layer on the end face or a corner portion where such a layer is hardly formed. Furthermore, even if such portions are slightly broken, the conductivity can be maintained.

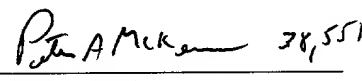
REMARKS

Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,

SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: June 29, 2001


for Darryl Mexic
Registration No. 23,063

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 4, ninth paragraph insert the following:

Figs. 8A and 8B are section views showing another [embodiments] embodiment of the present invention.

Page 4, tenth paragraph insert the following:

Figs. 9A and 9B are section views showing [another] other embodiments of the present invention.

Page 6, third paragraph insert the following:

[Fig. 3 shows] Figs. 3A-3B show an embodiment of the method of manufacturing the piezoelectric vibrator unit. A green sheet 32 of a piezoelectric material and having a predetermined thickness is prepared. In the green sheet, through holes 30a and 31a are opened in the vicinity of both ends thereof so as to coincide with the arrangement pitch of the piezoelectric vibrators (Fig. 3A). On the surface of the sheet, a strip-like non-conductive region 33 is formed in a region which is nearer to a center portion than the through holes 31a and which coincides with the front ends of the internal common electrodes 17. Conductive layers 34 and 35 are formed by, for example, printing of a conductive coating material so as to fill the inside of the through holes 30a and 31a (Fig. 3B).

IN THE ABSTRACT OF DISCLOSURE:

The abstract is changed as follows:

In order to simplify a step of forming a conductive layer for external connection and improve the reliability thereof, at least either internal individual electrodes or internal common electrodes, which [compose] comprise of a piezoelectric vibrator, are connected with each other at through holes situated

AMENDMENT

ATTORNEY DOCKET NO. Q64938

U.S. Appln. No. NOT YET ASSIGNED

[inner than a] spaced away from an end face of the piezoelectric vibrator and connected to either a segment electrode of a common electrode, which are formed on one surface in a longitudinal direction of the piezoelectric vibrator. According, it is not necessary to form a conductive layer on the end face or a corner portion where such a layer is hardly formed. Furthermore, even if such portions are slightly broken, the conductivity can be maintained.